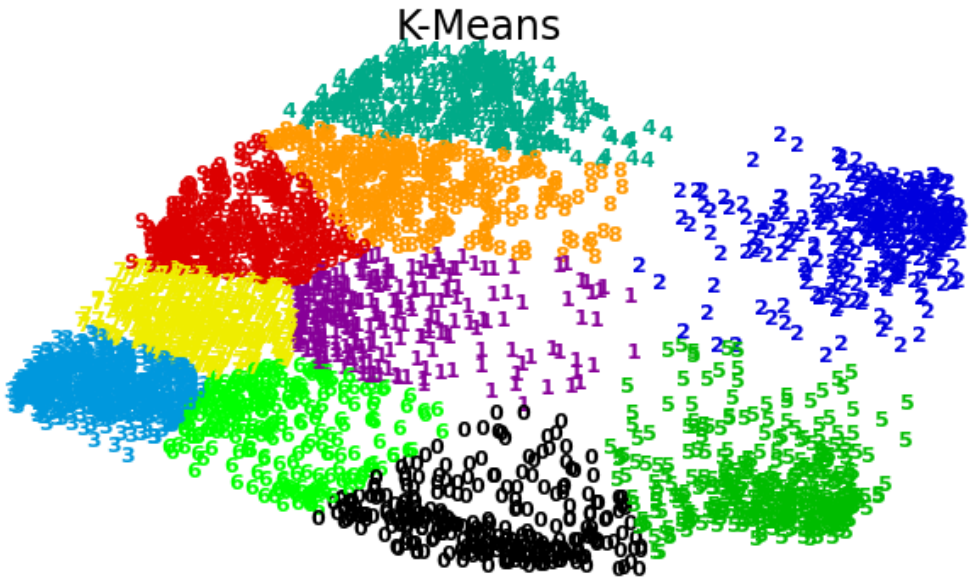
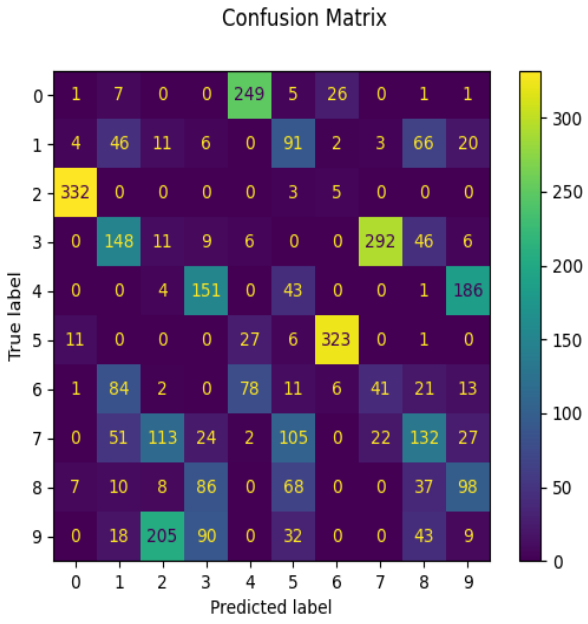
(A)

- Applied K-Means algorithm for the handwritten digits dataset.
- Assumed K =10
- Ran the algorithm.
- Plotted the results as instructed.



- Confusion Matrix

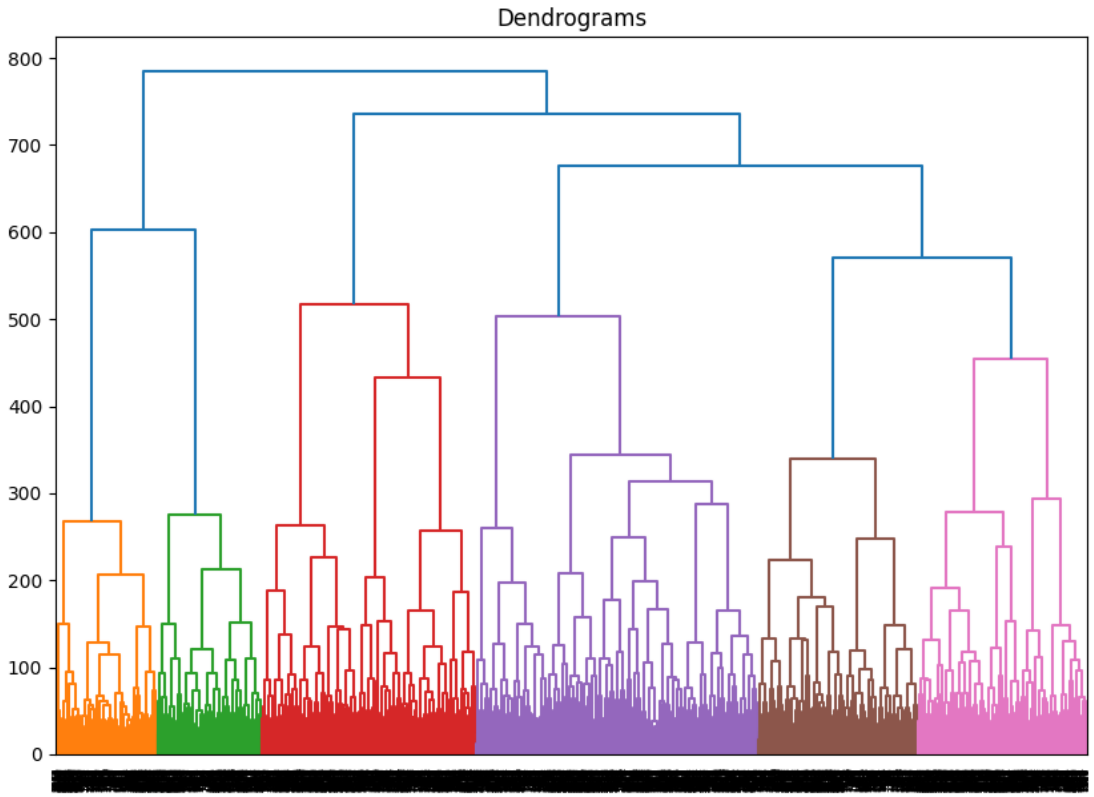


- Fowlkes-Mallows Index

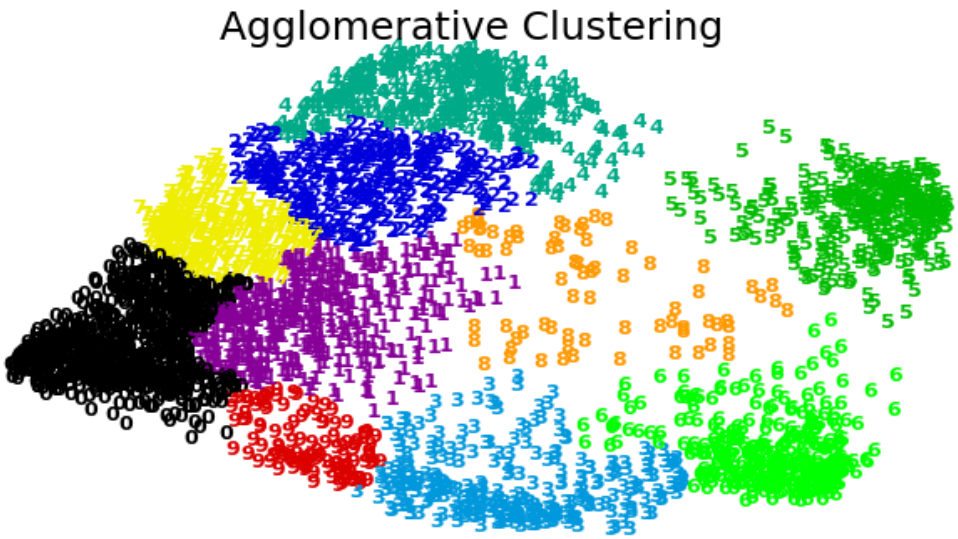
```
PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE

kt@trivedi:~/Academics/CS534 - AI/Assignment 3$ /usr/bin/python3 "/home/kt/Academics/CS534 - AI/Assignment 3/task_3_a.py"
Confusion matrix:
[[  1   7   0   0 249   5  26   0   1   1]
 [  4  46  11   6   0  91   2   3  66  20]
 [332   0   0   0   0   3   5   0   0   0]
 [  0 148  11   9   6   0   0 292  46   6]
 [  0   0   4 151   0  43   0   0   1 186]
 [ 11   0   0   0  27   6 323   0   1   0]
 [  1  84   2   0  78  11   6  41  21  13]
 [  0  51 113  24   2 105   0  22 132  27]
 [  7  10   8  86   0  68   0   0  37  98]
 [  0  18 205  90   0  32   0   0  43   9]]
Fowlkws - Mallows Index:  0.4508943276825517
kt@trivedi:~/Academics/CS534 - AI/Assignment 3$
```

(B)

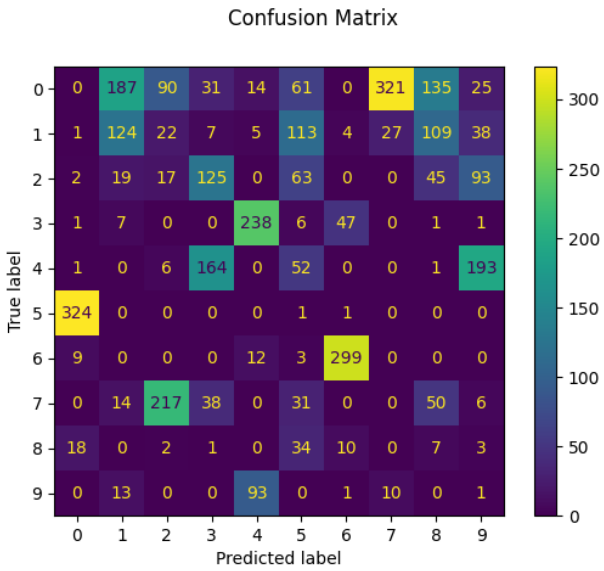
- Applied Agglomerative clustering algorithm with ward Linkage for the handwritten digits dataset.
- Assumed K =10
- Ran the algorithm.
- Observed the dendrograms.



- Plotted the results as instructed.



- Confusion Matrix

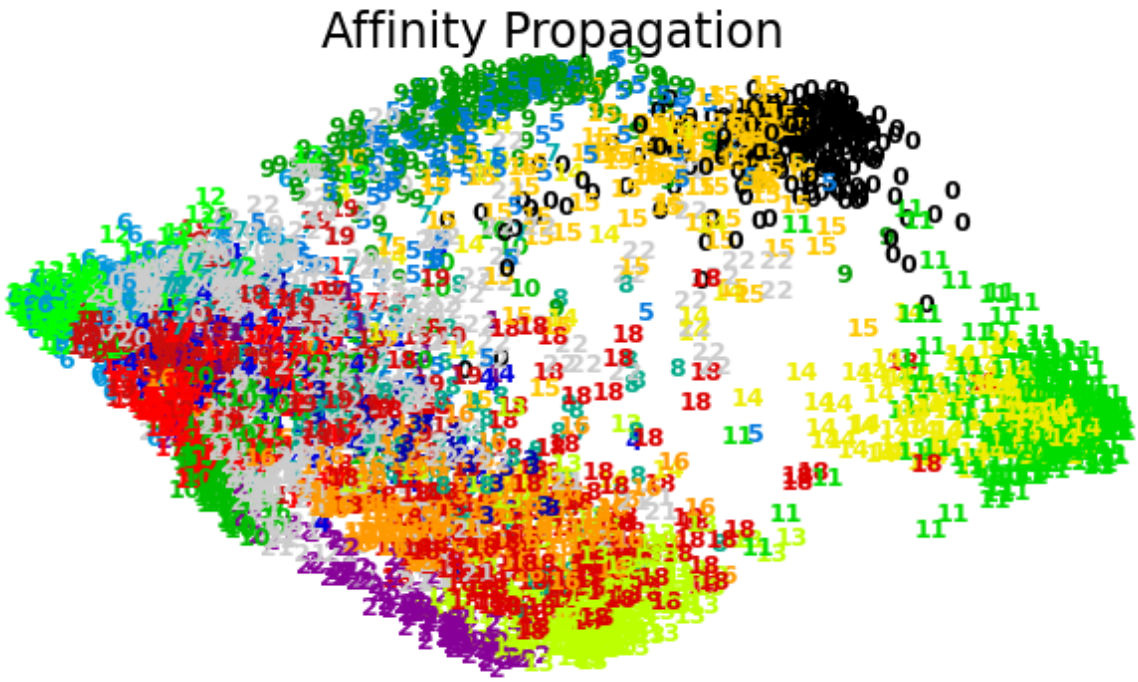


- Fowlkes-Mallows Index

```
PROBLEMS  OUTPUT  TERMINAL  DEBUG CONSOLE

kt@trivedi:~/Academics/CS534 - AI/Assignment 3$ /usr/bin/python3 "/home/kt/Academics/CS534 - AI/Assignment 3/task_3_b.py"
Confusion matrix:
[[  0 187  90  31  14  61   0 321 135  25]
 [  1 124  22   7   5 113   4  27 109  38]
 [  2  19  17 125   0  63   0   0  45  93]
 [  1   7   0   0 238   6  47   0   1   1]
 [  1   0   6 164   0  52   0   0   1 193]
 [324   0   0   0   0   1   1   0   0   0]
 [  9   0   0   0  12   3 299   0   0   0]
 [  0  14 217  38   0  31   0   0  50   6]
 [ 18   0   2   1   0  34  10   0   7   3]
 [  0  13   0   0  93   0   1  10   0   1]]
Fowlkws - Mallows Index:  0.42116800053227904
kt@trivedi:~/Academics/CS534 - AI/Assignment 3$
```

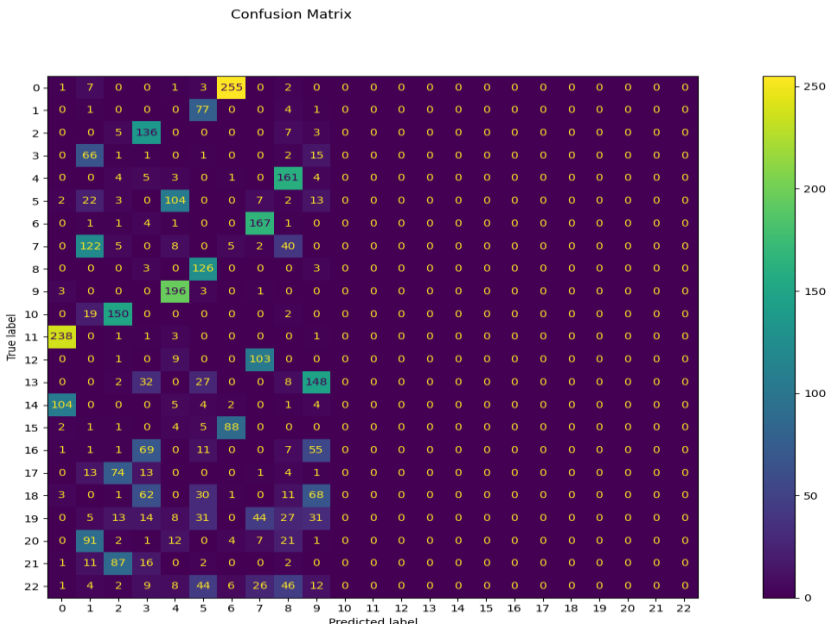
(C)

- Applied Affinity Propagation for the handwritten digits dataset and received the number of clusters returned by the algorithm.
- Ran the algorithm.
- Plotted the results as instructed.



- Noted the number of clusters given by the algorithm, for the given parameters number of clusters = 23. It can be observed in the below image.

- Confusion Matrix for the clusters returned by the algorithm.



- Fowlkes-Mallows Index